



OIIPE

ENTERED

RAW SEQUENCE LISTING

PATENT APPLICATION: US/10/081,644

DATE: 06/11/2002 P.6

TIME: 11:09:19

Input Set : A:\06501-100001.TXT

Output Set: N:\CRF3\06112002\J081644.raw

```

4 <110> APPLICANT: Yamamoto, Hiroaki
5      Kimoto, Norihiro
7 <120> TITLE OF INVENTION: NOVEL ENONE REDUCTASES, METHODS FOR
8      PRODUCING SAME, AND METHODS FOR SELECTIVELY REDUCING A
9      CARBON-CARBON DOUBLE BOND OF AN ALPHA,BETA-UNSATURATED KETONE
10     USING THE REDUCTASES
12 <130> FILE REFERENCE: 06501-100001
14 <140> CURRENT APPLICATION NUMBER: US 10/081,644
15 <141> CURRENT FILING DATE: 2002-02-21
17 <150> PRIOR APPLICATION NUMBER: JP 2001-49363
18 <151> PRIOR FILING DATE: 2001-02-23
20 <160> NUMBER OF SEQ ID NOS: 29
22 <170> SOFTWARE: FastSEQ for Windows Version 4.0
24 <210> SEQ ID NO: 1
25 <211> LENGTH: 1113
26 <212> TYPE: DNA
27 <213> ORGANISM: Kluyveromyces lactis
29 <220> FEATURE:
30 <221> NAME/KEY: CDS
31 <222> LOCATION: (1)...(1110)
33 <400> SEQUENCE: 1
34 atg tca gtt cca acc act caa aaa gcc gtc atc att gaa ggt gac aaa      48
35 Met Ser Val Pro Thr Thr Gln Lys Ala Val Ile Ile Glu Gly Asp Lys
36 1          5          10          15
38 gct gtt gtt aaa aca gat gtc tca gtt cca gaa tta aag gag ggt aca      96
39 Ala Val Val Lys Thr Asp Val Ser Val Pro Glu Leu Lys Glu Gly Thr
40          20          25          30
42 gcc ttg gtg aag gtt gag gct gtt gct ggt aac cca act gat tgg aag      144
43 Ala Leu Val Lys Val Glu Ala Val Ala Gly Asn Pro Thr Asp Trp Lys
44          35          40          45
46 cat att gct tat aag att ggt cca gaa ggt tca att cta gga tgt gac      192
47 His Ile Ala Tyr Lys Ile Gly Pro Glu Gly Ser Ile Leu Gly Cys Asp
48          50          55          60
50 att gct ggt aca gtt gtc aaa ctt gga cca aat gct agt act gac ttg      240
51 Ile Ala Gly Thr Val Val Lys Leu Gly Pro Asn Ala Ser Thr Asp Leu
52 65          70          75          80
54 aag gtt gga gat acc ggt ttc ggt ttt gtt cac ggt gct tcc caa aca      288
55 Lys Val Gly Asp Thr Gly Phe Gly Phe Val His Gly Ala Ser Gln Thr
56          85          90          95
58 gat cct aaa aat ggt gca ttt gct gaa tat gcc agg gtt tat cca cct      336
59 Asp Pro Lys Asn Gly Ala Phe Ala Glu Tyr Ala Arg Val Tyr Pro Pro
60          100          105          110
62 ttg ttt tac aag agt aac tta act cac tca act gct gat gaa att tct      384

```

RAW SEQUENCE LISTING
PATENT APPLICATION: US/10/081,644

DATE: 06/11/2002
TIME: 11:09:19

Input Set : A:\06501-100001.TXT
Output Set: N:\CRF3\06112002\J081644.raw

```

63 Leu Phe Tyr Lys Ser Asn Leu Thr His Ser Thr Ala Asp Glu Ile Ser
64      115      120      125      432
66 gaa ggc cct gtg aag aac ttc gaa tct gct gca tca ttg cca gtt tcg
67 Glu Gly Pro Val Lys Asn Phe Glu Ser Ala Ala Ser Leu Pro Val Ser
68      130      135      140      480
70 ttg aca act gct ggt gtt agt ttg tgt cat cac ttg ggc tca aaa atg
71 Leu Thr Thr Ala Gly Val Ser Leu Cys His His Leu Gly Ser Lys Met
72 145      150      155      160      528
74 gaa tgg cac cca tct acc ccg caa cat act cat cca tta ttg att tgg
75 Glu Trp His Pro Ser Thr Pro Gln His Thr His Pro Leu Leu Ile Trp
76      165      170      175      576
78 ggt ggt gct aca gca gtg ggt caa caa cta atc caa gtt gcc aaa cat
79 Gly Gly Ala Thr Ala Val Gly Gln Leu Ile Gln Val Ala Lys His
80      180      185      190      624
82 atc aat gct tat act aag att gta act gtt gct tct aaa aag cat gaa
83 Ile Asn Ala Tyr Thr Lys Ile Val Thr Val Ala Ser Lys Lys His Glu
84      195      200      205      672
86 aag ctt tta aag tct tat ggt gct gat gat gtc ttt gac tat cat gat
87 Lys Leu Leu Lys Ser Tyr Gly Ala Asp Asp Val Phe Asp Tyr His Asp
88      210      215      220      720
90 gca ggc gtt att gag cag atc aaa tcg aag tat cca aac ctg caa cat
91 Ala Gly Val Ile Glu Gln Ile Lys Ser Lys Tyr Pro Asn Leu Gln His
92 225      230      235      240      768
94 gtt att gac gct gtg gga agc gaa gat agt atc ccc gag gcc tat aaa
95 Val Ile Asp Ala Val Gly Ser Glu Asp Ser Ile Pro Glu Ala Tyr Lys
96      245      250      255      816
98 gtc aca gca gat agt cta cct gcc aca tta tta gaa gtg gtt cca atg
99 Val Thr Ala Asp Ser Leu Pro Ala Thr Leu Leu Glu Val Val Pro Met
100      260      265      270      864
102 acc att gaa agc att cct gaa gaa atc aga aaa gat aat gtt aaa att
103 Thr Ile Glu Ser Ile Pro Glu Glu Ile Arg Lys Asp Asn Val Lys Ile
104      275      280      285      912
106 gat att act ttg ttg tat cgt gca tct ggt caa gaa att cta ttg ggt
107 Asp Ile Thr Leu Leu Tyr Arg Ala Ser Gly Gln Glu Ile Leu Leu Gly
108      290      295      300      960
110 gca aca aga ttt cct gct agt cca gaa tat cat gaa gcc aca gtt aaa
111 Ala Thr Arg Phe Pro Ala Ser Pro Glu Tyr His Glu Ala Thr Val Lys
112 305      310      315      320      1008
114 ttc gtt aag ttt ata aat cca cac ctt aac aac ggt gat atc cat cat
115 Phe Val Lys Phe Ile Asn Pro His Leu Asn Asn Gly Asp Ile His His
116      325      330      335      1056
118 atg aat att aaa gtt ttc agc aac ggc tta gat gat gtc cca gct ctc
119 Met Asn Ile Lys Val Phe Ser Asn Gly Leu Asp Asp Val Pro Ala Leu
120      340      345      350      1104
122 act gaa ggt ata aaa gaa ggt aaa aac aaa aat gtt aag tat gtt gcc
123 Thr Glu Gly Ile Lys Glu Gly Lys Asn Lys Asn Val Lys Tyr Val Ala
124      355      360      365      1113
126 agg tta taa
127 Arg Leu

```

RAW SEQUENCE LISTING

DATE: 06/11/2002

PATENT APPLICATION: US/10/081,644

TIME: 11:09:19

Input Set : A:\06501-100001.TXT

Output Set: N:\CRF3\06112002\J081644.raw

```

128      370
131 <210> SEQ ID NO: 2
132 <211> LENGTH: 370
133 <212> TYPE: PRT
134 <213> ORGANISM: Kluyveromyces lactis
136 <400> SEQUENCE: 2
137 Met Ser Val Pro Thr Thr Gln Lys Ala Val Ile Ile Glu Gly Asp Lys
138 1      5      10      15
139 Ala Val Val Lys Thr Asp Val Ser Val Pro Glu Leu Lys Glu Gly Thr
140      20      25      30
141 Ala Leu Val Lys Val Glu Ala Val Ala Gly Asn Pro Thr Asp Trp Lys
142      35      40      45
143 His Ile Ala Tyr Lys Ile Gly Pro Glu Gly Ser Ile Leu Gly Cys Asp
144      50      55      60
145 Ile Ala Gly Thr Val Val Lys Leu Gly Pro Asn Ala Ser Thr Asp Leu
146 65      70      75      80
147 Lys Val Gly Asp Thr Gly Phe Gly Phe Val His Gly Ala Ser Gln Thr
148      85      90      95
149 Asp Pro Lys Asn Gly Ala Phe Ala Glu Tyr Ala Arg Val Tyr Pro Pro
150      100     105     110
151 Leu Phe Tyr Lys Ser Asn Leu Thr His Ser Thr Ala Asp Glu Ile Ser
152      115     120     125
153 Glu Gly Pro Val Lys Asn Phe Glu Ser Ala Ala Ser Leu Pro Val Ser
154      130     135     140
155 Leu Thr Thr Ala Gly Val Ser Leu Cys His His Leu Gly Ser Lys Met
156 145     150     155     160
157 Glu Trp His Pro Ser Thr Pro Gln His Thr His Pro Leu Leu Ile Trp
158      165     170     175
159 Gly Gly Ala Thr Ala Val Gly Gln Gln Leu Ile Gln Val Ala Lys His
160      180     185     190
161 Ile Asn Ala Tyr Thr Lys Ile Val Thr Val Ala Ser Lys Lys His Glu
162      195     200     205
163 Lys Leu Leu Lys Ser Tyr Gly Ala Asp Asp Val Phe Asp Tyr His Asp
164      210     215     220
165 Ala Gly Val Ile Glu Gln Ile Lys Ser Lys Tyr Pro Asn Leu Gln His
166 225     230     235     240
167 Val Ile Asp Ala Val Gly Ser Glu Asp Ser Ile Pro Glu Ala Tyr Lys
168      245     250     255
169 Val Thr Ala Asp Ser Leu Pro Ala Thr Leu Leu Glu Val Val Pro Met
170      260     265     270
171 Thr Ile Glu Ser Ile Pro Glu Glu Ile Arg Lys Asp Asn Val Lys Ile
172      275     280     285
173 Asp Ile Thr Leu Leu Tyr Arg Ala Ser Gly Gln Glu Ile Leu Leu Gly
174      290     295     300
175 Ala Thr Arg Phe Pro Ala Ser Pro Glu Tyr His Glu Ala Thr Val Lys
176 305     310     315     320
177 Phe Val Lys Phe Ile Asn Pro His Leu Asn Asn Gly Asp Ile His His
178      325     330     335
179 Met Asn Ile Lys Val Phe Ser Asn Gly Leu Asp Asp Val Pro Ala Leu

```

RAW SEQUENCE LISTING
PATENT APPLICATION: US/10/081,644

DATE: 06/11/2002
TIME: 11:09:19

Input Set : A:\06501-100001.TXT
Output Set: N:\CRF3\06112002\J081644.raw

```

180                               340                               345                               350
181 Thr Glu Gly Ile Lys Glu Gly Lys Asn Lys Asn Val Lys Tyr Val Ala
182                               355                               360
183 Arg Leu
184                               370
186 <210> SEQ ID NO: 3
187 <211> LENGTH: 1145
188 <212> TYPE: DNA
189 <213> ORGANISM: Saccharomyces cerevisiae
191 <220> FEATURE:
192 <221> NAME/KEY: CDS
193 <222> LOCATION: (6)...(1133)
195 <400> SEQUENCE: 3
196 caaac atg tct gcc tcg att cca gaa acc atg aaa gcc gtt gtc att gaa 50
197 Met Ser Ala Ser Ile Pro Glu Thr Met Lys Ala Val Val Ile Glu
198                               5                               10                               15
199 aat ggc aag gct gta gtc aaa cag gac att cca att cct gaa tta gaa 98
200 Asn Gly Lys Ala Val Val Lys Gln Asp Ile Pro Ile Pro Glu Leu Glu
201                               20                               25                               30
202 gaa gga ttt gtt cta att aag act gtc gcc gtt gcc ggt aac cct acc 146
204 Glu Gly Phe Val Leu Ile Lys Thr Val Ala Val Ala Gly Asn Pro Thr
205                               35                               40                               45
206 gat tgg aaa cat att gat ttc aag att ggt cct caa ggt gcc ctc tta 194
208 Asp Trp Lys His Ile Asp Phe Lys Ile Gly Pro Gln Gly Ala Leu Leu
209                               50                               55                               60
210 ggc tgt gat gca gcc gcc caa atc gta aag ttg ggc cca aat gtt gat 242
212 Gly Cys Asp Ala Ala Gly Gln Ile Val Lys Leu Gly Pro Asn Val Asp
213                               65                               70                               75
214 gct gca cgc ttt gcc att ggt gat tac att tat ggg gtt att cac ggt 290
216 Ala Ala Arg Phe Ala Ile Gly Asp Tyr Ile Tyr Gly Val Ile His Gly
217                               85                               90                               95
218 gct tca gtg agg ttc ccc tca aac ggt gcc ttt gct gag tac tct gcc 338
220 Ala Ser Val Arg Phe Pro Ser Asn Gly Ala Phe Ala Glu Tyr Ser Ala
221                               100                               105                               110
222 att tca tcc gag act gct tat aaa cca gcc aga gag ttt aga ttg tgc 386
224 Ile Ser Ser Glu Thr Ala Tyr Lys Pro Ala Arg Glu Phe Arg Leu Cys
225                               115                               120                               125
226 ggt aaa gac aag cta cca gaa ggc ccc gta aaa tct tta gaa ggg gca 434
228 Gly Lys Asp Lys Leu Pro Glu Gly Pro Val Lys Ser Leu Glu Gly Ala
229                               130                               135                               140
230 gta tcc ctc cca gtc tca ttg acc acg gct ggt atg atc ctt aca cat 482
232 Val Ser Leu Pro Val Ser Leu Thr Thr Ala Gly Met Ile Leu Thr His
233                               145                               150                               155
234 agt ttt ggc ttg gac atg aca tgg aag ccc tcc aaa gcg caa aga gat 530
236 Ser Phe Gly Leu Asp Met Thr Trp Lys Pro Ser Lys Ala Gln Arg Asp
237                               165                               170                               175
238 caa ccc atc tta ttt tgg ggt ggt gcc act gct gtt ggc cag atg ctt 578
240 Gln Pro Ile Leu Phe Trp Gly Gly Ala Thr Ala Val Gly Gln Met Leu
241                               180                               185                               190
242

```

RAW SEQUENCE LISTING

DATE: 06/11/2002

PATENT APPLICATION: US/10/081,644

TIME: 11:09:19

Input Set : A:\06501-100001.TXT

Output Set: N:\CRF3\06112002\J081644.raw

```

244 att caa ttg gca aaa aaa cta aac ggt ttc agc aag atc atc gtc gtt      626
245 Ile Gln Leu Ala Lys Lys Leu Asn Gly Phe Ser Lys Ile Ile Val Val
246          195          200          205
248 gct tct cgt aaa cat gaa aaa ttg ttg aaa gag tac ggt gca gat gaa      674
249 Ala Ser Arg Lys His Glu Lys Leu Leu Lys Glu Tyr Gly Ala Asp Glu
250          210          215          220
252 ctt ttt gac tac cac gat gct gac gtt atc gaa cag ata aaa aag aag      722
253 Leu Phe Asp Tyr His Asp Ala Asp Val Ile Glu Gln Ile Lys Lys Lys
254          225          230          235
256 tac aac aac att cct tac ttg gtg gac tgt gtc tcc aac aca gaa act      770
257 Tyr Asn Asn Ile Pro Tyr Leu Val Asp Cys Val Ser Asn Thr Glu Thr
258 240          245          250          255
260 att caa cag gtg tac aaa tgt gcc gct gat gac tta gac gct acg gtc      818
261 Ile Gln Gln Val Tyr Lys Cys Ala Ala Asp Asp Leu Asp Ala Thr Val
262          260          265          270
264 gtt caa ttg acc gtt tta acc gaa aaa gat atc aag gag gaa gac agg      866
265 Val Gln Leu Thr Val Leu Thr Glu Lys Asp Ile Lys Glu Glu Asp Arg
266          275          280          285
268 agg caa aac gtc agt att gaa gga acc ctt cta tat ttg ata gga ggt      914
269 Arg Gln Asn Val Ser Ile Glu Gly Thr Leu Leu Tyr Leu Ile Gly Gly
270          290          295          300
272 aac gac gtc cca ttt ggc acg ttt act ttg cca gca gac cct gaa tac      962
273 Asn Asp Val Pro Phe Gly Thr Phe Thr Leu Pro Ala Asp Pro Glu Tyr
274          305          310          315
276 aag gaa gcc gcc ata aaa ttt att aag ttc atc aat cca aaa atc aat      1010
277 Lys Glu Ala Ala Ile Lys Phe Ile Lys Phe Ile Asn Pro Lys Ile Asn
278 320          325          330          335
280 gat ggt gaa atc cac cac atc cca gtg aaa gtt tac aag aac ggg tta      1058
281 Asp Gly Glu Ile His His Ile Pro Val Lys Val Tyr Lys Asn Gly Leu
282          340          345          350
284 gat gat atc cca cag tta ctt gat gat att aag cac ggg agg aat tct      1106
285 Asp Asp Ile Pro Gln Leu Leu Asp Asp Ile Lys His Gly Arg Asn Ser
286          355          360          365
288 ggc gaa aag ttg gtt gcc gtc ttg aaa taatctagac tg      1145
289 Gly Glu Lys Leu Val Ala Val Leu Lys
290          370          375
293 <210> SEQ ID NO: 4
294 <211> LENGTH: 376
295 <212> TYPE: PRT
296 <213> ORGANISM: Saccharomyces cerevisiae
298 <400> SEQUENCE: 4
299 Met Ser Ala Ser Ile Pro Glu Thr Met Lys Ala Val Val Ile Glu Asn
300 1          5          10          15
301 Gly Lys Ala Val Val Lys Gln Asp Ile Pro Ile Pro Glu Leu Glu Glu
302          20          25          30
303 Gly Phe Val Leu Ile Lys Thr Val Ala Val Ala Gly Asn Pro Thr Asp
304          35          40          45
305 Trp Lys His Ile Asp Phe Lys Ile Gly Pro Gln Gly Ala Leu Leu Gly
306          50          55          60

```

RAW SEQUENCE LISTING ERROR SUMMARY
PATENT APPLICATION: US/10/081,644

DATE: 06/11/2002
TIME: 11:09:20

Input Set : A:\06501-100001.TXT
Output Set: N:\CRF3\06112002\J081644.raw

Please Note:

Use of n and/or Xaa have been detected in the Sequence Listing. Please review the Sequence Listing to ensure that a corresponding explanation is presented in the <220> to <223> fields of each sequence which presents at least one n or Xaa.

Seq#:11; N Pos. 12
Seq#:12; N Pos. 18
Seq#:13; N Pos. 9

6/11/02

VERIFICATION SUMMARY

DATE: 06/11/2002

PATENT APPLICATION: US/10/081,644

TIME: 11:09:20

Input Set : A:\06501-100001.TXT

Output Set: N:\CRF3\06112002\J081644.raw

L:696 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:700 M:258 W: Mandatory Feature missing, <220> not found for SEQ ID#:11
L:701 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:11 after pos.:0
L:711 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:715 M:258 W: Mandatory Feature missing, <220> not found for SEQ ID#:12
L:716 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12 after pos.:0
L:726 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:730 M:258 W: Mandatory Feature missing, <220> not found for SEQ ID#:13
L:731 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:13 after pos.:0